

Kentucky, Michigan, Minnesota, New Mexico, North Dakota, South Carolina, and Wisconsin. 3d, Maryland, Montana, New Jersey, New York, North Carolina, Pennsylvania, South Carolina, South Dakota, Tennessee, Virginia, and West Virginia. 4th, Iowa, Maine, Minnesota, Montana, Nebraska, North Dakota, South Dakota, Virginia, and Wisconsin. 5th, Colorado, Connecticut, Missouri, New Jersey, New York, Pennsylvania, South Dakota, and Washington.

6th, Georgia, Iowa, Massachusetts, Ohio, Oregon, Tennessee, and Wyoming. 7th, Colorado, Indiana, Iowa, Michigan, Minnesota, North Carolina, North Dakota, Ohio, and Wisconsin. 8th, Colorado, Maryland, Minnesota, North Carolina, North Dakota, and Ohio. 9th, Arizona, Colorado, New Mexico, New York, North Carolina, and Wisconsin. 10th, Minnesota, Montana, North Carolina, South Carolina, and South Dakota. 11th, Colorado, Idaho, North Dakota, Utah, and Wisconsin. 12th, Nebraska, New Jersey, and Oregon. 13th, Iowa, Michigan, Montana, Nebraska, New Jersey, Pennsylvania, and Utah.

14th, Iowa, Montana, Nebraska, North Dakota, Utah, Virginia, and West Virginia. 15th, Iowa, Minnesota, Nebraska, New York, North Dakota, Ohio, and Pennsylvania. 16th, Iowa, Kansas, Michigan, Nebraska, and South Dakota. 17th, Colorado, Indiana, Kansas, Michigan, Missouri, Nebraska, New York, Pennsylvania, and South Dakota. 18th, Connecticut, Nebraska, New York, and South Carolina. 19th, Massachusetts. 21st, New York. 22d, Connecticut, Massachusetts, Nebraska, New York, Rhode Island, and Vermont.

23d, Massachusetts, Montana, New Hampshire, and Vermont. 24th, Florida, Minnesota, and North Dakota. 25th, Iowa, Michigan, Minnesota, Nebraska, and Nevada. 26th, Colorado, Connecticut, Florida, Maine, Maryland, Massachusetts, Nevada, North Carolina, North Dakota, Ohio, Tennessee, and Vermont. 27th, Colorado, Florida, Kansas, North Dakota, South Dakota, and Utah. 28th, Colorado, New Mexico, and South Dakota. 29th, Indiana, Mississippi, South Dakota, and Virginia. 30th, Illinois, Kentucky, Minnesota, and Ohio. 31st, North Carolina and Ohio.

WINDS.

The prevailing winds in July, 1893, are shown on Chart II by arrows flying with the wind. In the New England, middle Atlantic, and east Gulf states, the Ohio Valley and Tennessee, the upper lake region, the extreme northwest, the upper Mississippi valley, and along the north and middle Pacific coasts the winds were generally from southwest to northwest; over the Florida Peninsula, from east to southeast; in the south Atlantic states and over the northern plateau region, from south to southwest; in the west Gulf states and the Missouri Valley, from east to south; on the northeast slope of the Rocky Mountains, in the lower lake region, and over the southern and middle plateau regions, from southeast to southwest; on the middle-eastern slope of the Rocky Mountains, from southeast to south; on the southeast slope of the Rocky Mountains, from south to west; and on the north Pacific coast, from west to northwest.

HIGH WINDS. (In miles per hour.)

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Weather Bureau as follows:

1st, 72, w., at Amarillo, Tex.; 54, nw., at Dodge City, Kans. 3d, 50, w., at Pierre, S. Dak. 7th, 64, w., at Pikes Peak, Colo.; 54, nw., at Detroit, Mich. 10th, 52, nw., at Havre, Mont. 14th, 60, nw., at Hatteras, N. C.; 52, w., at Valentine, Nebr. 15th, 80, sw., at Kearney, Nebr.; 59, nw., at Columbus, Ohio; 50, nw., at Cleveland, Ohio. 16th, 58, nw., at Concordia, Kans. 20th, 52, nw., at Havre, Mont. 24th, 60, sw., at Amarillo, Tex. 25th, 60, ne., at Pueblo, Colo. 28th, 50, nw., at Saint Louis, Mo.

LOCAL STORMS.

(75th meridian time is used at regular Weather Bureau stations.)

1st.—Hailstorms occurred in Vermont, eastern New York, the Dakotas, and Kansas, and a severe local rainstorm was reported near Pittsburg, Pa. At Albany, N. Y., a thunderstorm continued from 5.17 to 7.44 p. m. At Saratoga, N. Y., the rainfall was very heavy. Heavy hail fell at Sand Lake, N. Y. At Bath, N. Y., a barn was struck by lightning. About 3 p. m. a local rainstorm occurred near Sharpsburg, Allegheny County, Pa.; a creek which flows through Pleasant Valley into the Allegheny River was flooded, causing considerable damage to property. A thunder and hail storm was reported southeast of Woodbridge, N. Dak., and stock was killed by lightning at Langdon, N. Dak. Damage by hail was reported

at Glenwood, Nebr. A severe wind, rain, and thunder storm was reported at Cawker, Wakefield, and Dodge City, Kans.

2d.—Thunderstorms occurred in the Ohio Valley, Lower Michigan, Kansas, and Nebraska. At Madison, Ind., thunder was attended by heavy rain and hail. A hailstorm damaged crops south of Oswego, Ill. A heavy thunder, rain, and wind storm occurred at Detroit, Mich., in the afternoon. At Syracuse, Kans., a church was struck by lightning. At Oklahoma, Okla., a severe thunderstorm occurred in the early morning; two oil tanks were struck by lightning, and exploded.

3d.—Severe thunderstorms were reported in New York and Pennsylvania, and hailstorms occurred in South Carolina, Georgia, and Tennessee. A thunder and hail storm visited Maryland. Wind, rain, and hail caused damage about Hampton, S. C. Near Statesboro, Ga., 2 persons were killed by lightning. About Springdale, Tenn., corn and fruit were damaged by high wind and hail. One person was killed by lightning at West Point, Nebr.

4th.—Destructive local storms occurred in Maine and Missouri. From 1.30 to 3.20 p. m. a thunderstorm moved southeast along the Saco River, Maine. At Saco, Biddeford, and Old Orchard considerable damage was caused by wind and hail. At Saint Louis, Mo., a thunderstorm began 1.30 and ended 2.40 p. m. The barograph showed a decrease of pressure of .20 inch from 1 to 2.15 p. m., and a south gale continued from 2 to 3 p. m. Exceptionally severe thunder and rain storms occurred in central and western Missouri. Damage by hail was reported at Pleasant Valley and Alkali Creek, S. Dak.

5th.—Destructive thunderstorms occurred in the south New England states, New York, New Jersey, Pennsylvania, Louisiana, Michigan, Minnesota, and Nebraska. At night thunderstorms, with hail, caused damage of a minor character in Connecticut and on Long Island. A severe thunderstorm was reported at Rondout, N. Y. Camden, N. J., was visited by a hailstorm in the afternoon. At Philadelphia, Pa., a thunderstorm prevailed from 5.48 to 6.48 p. m., and hail fell for one minute. In the northern part of the city the storm was very destructive to frail buildings, etc. In the southern portion of the city the storm was scarcely felt. In the Schuylkill Valley great damage was caused by rain and hail. A hailstorm passed southward over Phoenixville, Pa., at 5.40 p. m. Two persons and some stock were killed by lightning at Donaldsonville, La. A heavy thunder, rain, and hail storm

moved east over Tyler, Minn., at 7.30 p. m. A thunder, rain, and hail storm moved east over Rogers, Nebr., in a path 40 to 60 rods in width, between 7 and 8 p. m., causing damage to the estimated extent of \$10,000.

6th.—Thunderstorms were reported in Massachusetts, Georgia, Florida, Michigan, and South Dakota, and a tornado visited northwestern Iowa. During thunder and hail squalls in the early morning at Vineyard Haven, Mass., a schooner was struck by lightning. In the afternoon a man was killed by lightning at Oxford, Ga. Two buildings were struck by lightning at Melrose, Fla. A severe thunderstorm was reported at Berrien Springs, Mich., in the morning.

Probably the most destructive tornado that ever visited Iowa swept over the northwestern portion of the state in the evening. The storm passed eastward about 2 miles north of Quimby, Cherokee County, at 4.35 p. m.; reached a point about 3 miles south of Alta, Buena Vista County, at 5.20 p. m.; arrived at Storm Lake, Buena Vista County, 5.30 p. m., and moving thence in a south of east direction south of Newell, Buena Vista County, reached Pomeroy, Pocahontas County, between 6.30 and 7 p. m., the average velocity from Quimby to Pomeroy being 27 to 30 miles per hour. In a track varying from 15 to 20 rods to $\frac{1}{2}$ mile in width about 50 persons were killed, upward of 100 injured, and property to the estimated value of about \$200,000 was destroyed. The greatest destruction was caused at Pomeroy, where 44 persons were killed and about 100 buildings valued at \$175,000 were destroyed or badly wrecked in a path about 80 rods in width. While passing south of Alta the storm was attended by intensely sharp forked lightning, large hail, and heavy rain. In Buena Vista County 6 persons were killed, and the loss to property was placed at \$20,000. At Storm Lake the path of the tornado was 20 to 40 rods in width, and water in the lake was lifted high into the air. Observers all along the line of the storm's advance report the meeting of two clouds at points where the destruction was greatest.

7th.—Thunderstorms occurred in the upper lake region, Minnesota, Iowa, and the Dakotas. At Westfield, Wis., 3 barns were struck by lightning. A house was struck by lightning at Black River Falls, Wis. Stock was killed by lightning at Saint Charles, Minn. Crops about Grand Meadow, Minn., were damaged by wind and rain. Severe thunder, hail, and wind storms, traveling in narrow paths, were reported about Fayette, Iowa. A severe storm of wind, rain, and hail was reported at Hampton, Iowa. Hail destroyed grain about Forman and Berlin, N. Dak. Heavy rain washed out railroads about Pueblo, Colo.

8th.—Severe thunderstorms occurred in the middle and south Atlantic and south New England states, the Ohio Valley, Michigan, and Minnesota, and heavy rain fell in southern Colorado. At New Haven, Conn., fire, caused by lightning, consumed 70 freight cars. An exceptionally severe thunder and rain storm moved northeast over New York, N. Y., in the evening. The wind shifted around the compass several times as the storm-center passed, and reached a velocity of 36 miles per hour, causing considerable damage in the outskirts of the city. A man was killed by lightning. A heavy thunder, rain, and hail storm moved eastward over Lyons, N. Y., about noon. Stock was killed by lightning at New Lisbon, N. Y. Two buildings were struck by lightning in Wyoming County, N. Y. Destructive wind attended thunderstorms in New Jersey. At New Brunswick, N. J., the wind increased to a gale at 5.50 p. m., and a thunderstorm continued from 6.03 to 6.40 p. m. Many trees were uprooted.

At Kilmer, Pa., a severe thunderstorm was preceded by high wind. At Baltimore, Md., a thunderstorm began at 4.10 p. m., and the wind reached a velocity of 33 miles per hour. Damage was caused in the city by wind and lightning; in the sur-

rounding country fruit and crops were injured by hail. In the early afternoon several churches in Parkersburg, W. Va., were struck by lightning. At Lexington, Ky., a house was struck and stock was killed by lightning in the evening. At Greendale, Ky., considerable damage was caused by high wind. At Cincinnati, Ohio, a thunderstorm prevailed from 5.45 to 6.15 p. m., with wind reaching a velocity of 36 miles per hour from the northwest. Hail fell in the eastern part of the city. At Berlin, Mich., a house was struck by lightning. One person was killed by lightning at Ozark, Mo. A destructive hailstorm was reported in Otter Tail County, Minnesota.

9th.—Severe storms were reported in northern Georgia, southeastern Tennessee, northern Illinois, and eastern Wisconsin. A heavy thunderstorm, with high wind, visited Chicago, Ill., in the evening. A boat was capsized, drowning 4 persons, a captive balloon at the Columbian Exposition Grounds was wrecked, and many buildings were damaged. At Milwaukee, Wis., a severe rain, wind, and hail storm from the west-northwest began at 4.22 p. m. and ended at 5.15 p. m.

10th.—Thunderstorms, with heavy rain and high wind, were reported on the South Carolina and Georgia coasts. At Havre, Mont., a thunderstorm began 10.40 p. m., with rain and high wind, and ended the early morning of the 11th.

11th.—At Gainesville, Fla., a house was struck by lightning. An unusually severe thunderstorm occurred at night at Ada, Minn. A sudden and violent wind and rain storm struck Gila Bend, Ariz., about 3 p. m.

12th.—Severe thunderstorms occurred in Connecticut, New York, Florida, and Minnesota. At North Hammond, N. Y., a man was killed by lightning. Two houses were struck by lightning at Pensacola, Fla.

13th.—Destructive thunderstorms were reported in Mississippi, the Ohio Valley, Michigan, northern Illinois, and eastern Iowa. At Binola, Ohio, stock was killed, and three buildings were struck by lightning. A thunderstorm from the north passed over Detroit, Mich., in the afternoon, causing considerable damage in the north and northeast portions of the city. At Kalamazoo, Mich., lightning struck in ten places, causing damage to the extent of about \$30,000. Severe storms were reported at various points throughout the state. Near Pickford 2 men were killed by lightning. At Chicago, Ill., a violent thunderstorm occurred at night.

14th.—Local storms were reported in Maryland, Virginia, Ohio, Michigan, Wisconsin, Minnesota, Iowa, and Nebraska. At Hagerstown, Md., a storm moved east in a path about one-half mile in width at 4.30 p. m., with heavy rain, vivid lightning, and small hail. The storm advanced as a huge, fast-moving cloud mass, with a long strip of cloud of a green hue, and was followed by a calm; ten buildings were damaged. During a thunderstorm at Spotsville, Va., a barn was destroyed. A severe thunderstorm, with heavy rain, visited Buckhannon, W. Va., in the afternoon. A barn was struck by lightning and burned at Weymouth, Ohio. During a thunderstorm at Green Bay, Wis., a house and several trees were blown down. Damage by wind and lightning was reported at other points in eastern Wisconsin. A severe local storm moved north of east over Stillwater, Minn., at 3.10 p. m., killing two persons, injuring several, and destroying property to the value of about \$10,000. A violent thunderstorm passed northeast over Moorhead, Minn., in the morning. Damage by lightning was reported at Fargo, N. Dak. Crops about Glenwood, Nebr., were damaged by hail.

15th.—Severe thunderstorms occurred in Connecticut, New York, Pennsylvania, Ohio, Iowa, South Dakota, and Nebraska, and heavy rain was reported in south-central Arizona. At New Haven, Conn., a thunderstorm continued

throughout the evening. During a thunderstorm in the late afternoon at Buffalo, N. Y., the wind reached a velocity of 48 miles per hour. At Addison, N. Y., a barn was struck by lightning and burned. During a thunder and hail storm 2 barns were struck by lightning and burned near Humphrey, N. Y. Stock was killed by lightning at Elton, N. Y. During a thunder and rain storm in the evening at Pittsburg, Pa., 2 houses were struck by lightning. During a thunderstorm in the evening at Columbus, Ohio, the wind reached a velocity of 59 miles per hour. About 2 p. m. a heavy thunder and rain storm moved southeast over Tiffin, Ohio. The storm was destructive 60 to 100 feet above ground. Damage was caused by high wind about Sylvania, Ohio. A destructive hailstorm visited the northwestern portion of Cedar County, Nebr. Small grain about Ewing, Nebr., was damaged by hail. Damage by hail and high wind was reported at Tekamah, Nebr. An exceptionally severe thunderstorm visited Kearney, Nebr., in the evening. Five minutes after the storm began the wind reached a velocity of 80 miles per hour. The storm-cloud approached from the southwest, and property to the value of about \$10,000 was destroyed in a path one-fourth mile in width. Thunderstorms and heavy rain were reported in south-central Arizona.

16th.—Thunderstorms caused damage of a minor character about Norfolk, Va. Buildings near Hollands Store, S. C., were damaged by wind. Destructive wind, rain, and hail storms were reported in south-central Nebraska and north-central Kansas.

17th.—Severe thunderstorms occurred in Georgia, Illinois, and Missouri. At Louisville, Ill., a man was killed by lightning. During a heavy thunder and rain storm at Saint Louis, Mo., in the afternoon one man was killed and 25 to 30 buildings were struck by lightning, and considerable damage was caused by rain. At Clifton Heights, a suburb 6 miles southwest of Saint Louis, 4.00 inches of rain fell in about 1½ hour.

18th.—Violent thunderstorms were noted in Massachusetts, Connecticut, New Jersey, and Georgia. In the evening damage by wind, rain, and lightning was reported in towns about Boston, Mass. The storm was very severe in northern Connecticut. About East Hartford the damage to the tobacco crop was estimated at \$100,000. Storms in the evening caused damage along the New Jersey coast. An exceptionally severe thunderstorm visited Augusta, Ga., between 5 and 7 p. m. The damage to property by lightning was placed at \$10,000.

20th.—A thunderstorm, during which the wind reached a velocity of 80 miles per hour for 3 or 4 minutes, caused considerable damage at Havre, Mont., in the evening. Heavy rain was reported in southern Arizona. A cloudburst occurred in the canyons near Tehachapi, Cal., destroying mining and mill property and crops.

21st.—A hailstorm was reported near Lebanon Springs, N. Y. One person was killed by lightning near Brooksville, Fla. A heavy thunder and rain storm occurred at Dodge City, Kans., in the early morning. Thunderstorms, with heavy rain, occurred at Yuma, Ariz., in the afternoon and evening.

22d.—Severe thunderstorms occurred in New York and northern New England. During a thunder and hail storm in the afternoon at Hartland, Vt., a barn was blown over and one man and a horse were killed. At Arlington and Provincetown, Mass., buildings were damaged by lightning. Heavy hail fell at points in northern New York.

23d.—Destructive thunder and rain storms occurred in the afternoon and evening about Keeler, Cal.

24th.—Two thunderstorms appeared west of Titusville,

Fla., about 1 p. m., one moving southwest and the other northwest. About 2.30 p. m. the storms apparently united and moved eastward, attended by heavy rain and hail. At 3.12 p. m. the wind veered to southeast and reached a velocity of 42 miles per hour and an extreme velocity of 60 miles. The storm was reported the most violent of the season at Titusville. Hail caused damage about New Salem, N. Dak.

25th.—A heavy thunderstorm occurred at Chattanooga, Tenn., in the evening. Heavy thunder and hail storms were reported about Red Wing, Minn., in the afternoon. Damage by lightning was reported in Indiana and Iowa.

26th.—Destructive thunderstorms were noted in the middle Atlantic and New England states, Tennessee, Ohio, and Kansas, and heavy rain fell in southern Colorado. A thunder and wind storm, with hail, was reported at Farmington, Me. Damage by lightning was reported at Taunton, Mass. The storm was very severe at New Haven, Conn., in the early afternoon. Shortly before noon two persons were killed by lightning on Coney Island, and one on Staten Island, N. Y. About 2 a. m. a house and barn in Malone, N. Y., were struck by lightning. A thunder and hail storm occurred at Knoxville, Tenn., in the afternoon. In the afternoon a house in Topeka, Kans., was struck by lightning. Heavy rain caused damage about Achilles, Kans. At Pueblo, Colo., heavy rain began 10.26 p. m. and ended the early morning of the 27th. Above Pueblo the Arkansas River rose rapidly above the north levee and the levee broke in several places, causing damage by flood to the extent of about \$200,000. The water subsided rapidly.

27th.—Severe thunderstorms occurred in South Carolina, Georgia, the Dakotas, and Kansas. At Charleston, S. C., and Albany, Ga., lightning struck in several places. At Spearfish, S. Dak., a barn was struck by lightning. At Bismarck, N. Dak., a house was struck by lightning. A house was struck by lightning at Topeka, Kans. At Yates Center, Kans., a thunderstorm in the evening was attended by heavy rain, hail, and a southwest gale.

28th.—Destructive wind and thunder storms occurred in the evening in Missouri. At Springfield, Mo., a man and a horse were killed by lightning. At Saint Louis, Mo., a thunderstorm at night was attended by a wind velocity of 50 miles per hour from the northwest.

29th.—Heavy thunderstorms occurred in Kentucky, Missouri, and eastern Kansas. During a thunderstorm at Louisville, Ky., in the early afternoon the wind reached a velocity of 46 miles per hour. At night several buildings were struck and stock was killed by lightning at Harrisonville, Mo. Damage by rain was reported about Tribune, Kans., and a severe wind and rain storm occurred at Leavenworth, Kans., at night.

30th.—Exceptionally heavy rain fell at Waynesboro, Tenn., at night. At Greensburg, Ky., 2 barns were struck and stock was killed by lightning. A man was killed by lightning near Olney, Ill. Two barns were struck by lightning at Vermont, Mo. A storm wrecked several small buildings at Columbus, Kans. A cloudburst was reported in the southeast portion of Rawlins County, Kansas, at night.

31st.—In the morning a man was killed by lightning at Navassa, N. C. A barn was struck and a horse was killed by lightning at Bedford City, Va. Severe thunderstorms were reported at Springdale, Tenn., and McConnellsburg, Ohio. At 4 p. m. a heavy rain and hail storm, with a few flashes of lightning, moved east over Caldwell, Ohio, in a path one-fourth mile in width, damaging property to the extent of about \$4,000. A house was struck by lightning at Childress, Tex.